



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/573,661 | 03/28/2006 | Hiroshi Tokairin | 287343US0PCT | 5655 |
| 22850 7590 06/04/2010 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | | |
| EXAMINER BOHATY, ANDREW K | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 1786 | | | | |
| NOTIFICATION DATE | | DELIVERY MODE | | |
| 06/04/2010 | | ELECTRONIC | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com

oblonpat@oblon.com

jgardner@oblon.com

Office Action Summary

Application No.

10/573,661

Applicant(s)

TOKAIRIN ET AL.

Examiner

Andrew K. Bohaty

Art Unit

1786

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office action is in response to amendment filed March 29, 2010 which amends claims 1, 7, and 20. Claims 1-20 are currently pending.

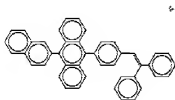
Response to Amendment

2. The applicant's amendment filed March 29, 2010 overcame the rejection of claim 6 under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023) in view of Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka") and Igarashi (US 2001/0008711) as set forth in the Office action mailed October 28, 2009.

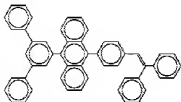
Response to Arguments

3. Applicant's arguments filed March 29, 2010 have been fully considered but they are not persuasive.

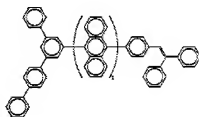
4. In response to the applicant's arguments on pages 23 and 24 that compounds A-1 and A-2 from Ikeda no longer reads on applicant's amended claims 1, 4, and 5, the amendment caused a reinterpretation of the reference and below are some of the compounds that read on the applicant's claims are A-1, A-2, and B10. Compound A-1



, of Ikeda reads on applicant's formula (I) where R^1 - R^8 are hydrogen, Ar^1 is an unsubstituted aryl group having 10 nuclear carbon atoms, and Ar^2 is an unsubstituted aryl group having 20 nuclear carbon atoms. Compound A-2,



, of Ikeda reads on applicant's formula (I), where R^1 - R^8 are hydrogen, Ar^1 is a substituted aryl group having 6 nuclear carbon atoms and the two substituents are both aryl groups (phenyl groups), and Ar^2 is an unsubstituted aryl group



having 20 nuclear carbon atoms. Compound B10, , reads on applicant's formula (I), where R^1 - R^8 are hydrogen, Ar^1 is a substituted aryl group having 6 nuclear carbon atoms and the two substituents are both aryl group (phenyl and biphenyl), and Ar^2 is an substituted aryl group having 14 nuclear carbon atoms, where

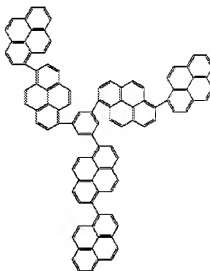


the aryl group that is the substituent is . Compound B10 reads on applicant's formula (II), where a and b are zero, c is 1, n is 1, Ar is a substituted aryl group having 14 nuclear carbon atoms, where the aryl group that is the substituent is

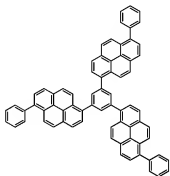


, Ar' is an unsubstituted aryl group having 6 nuclear carbon atoms, and X is an unsubstituted aryl group having 12 nuclear carbon atoms. Since these compounds taught by Ikeda still read on the applicant's amended claims, the rejection is not withdrawn.

5. In response to the applicant's arguments on pages 25-27, that Suzuki does not read on applicant's amended claims 1, 6, and 7, the amendment caused a

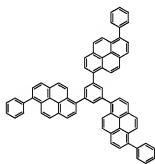


reinterpretation of the reference. Compound 27, , of Suzuki still reads on applicant's formula (VI), where d is 0, e and n¹ are 1, Ar⁵ is an unsubstituted fused aryl group having 16 nuclear carbon atoms, and X² and Ar⁶ are both unsubstituted aryl groups having 32 nuclear atoms. Furthermore, Suzuki teaches an organic luminescent device wherein the blue light emitting layer comprises an asymmetric pyrene compound (paragraphs [0093]-[0101], compound 27). Suzuki teaches formula (X), which can be bound to any of the formula (I)-(VII) (paragraph [0020]). Suzuki further teaches that R₂₁ can be a substituted or unsubstituted aryl group, such as phenyl, biphenyl, and terphenyl (paragraphs [0021] and [0035]) leading to asymmetric pyrene groups. This teaching by Suzuki can lead to a compound with the

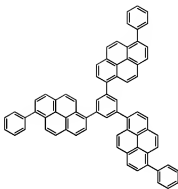



following formula, where formula V is used from Suzuki, and R^{21} is phenyl, Ar_{12} - Ar_{13} are formula (X), and R_{14} - R_{16} are hydrogen.

6. It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed an asymmetric compounds using formula (X) of Suzuki because Suzuki teaches that R_{21} can be a substituted or unsubstituted aryl group, such as phenyl, biphenyl, and terphenyl, and the pyrene unit further comprises a substituted phenyl group, which would result in asymmetric compounds and this can lead to a



compound with the following formula, One would expect the formation and use of an asymmetric compound using formula (X) to result in a device having very high efficiency and luminance because such a compound is within the teachings of Suzuki as a desirable material for forming an organic layer of an organic



electroluminescent device. This compound, , reads on applicant's formula (V), where R^{11} - R^{18} are hydrogen, Ar^3 is an unsubstituted aryl group having 6 nuclear atoms, Ar^4 is an unsubstituted aryl group having 50 nuclear carbon atoms. Since these compounds taught by Ikeda still read on the applicant's amended claims, the rejection is not withdrawn.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

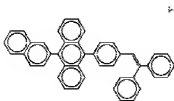
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1-5 and 8-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation, in view of Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka"), wherein a machine translation is used as the English translation.

10. Regarding claims 1-5 and 8-20, Ikeda teaches an organic electroluminescent device comprising an anode, a hole injecting layer composed of TPD232 (applicant's formula (X)) disposed on the anode (claims 15 and 16, paragraphs [0143] and [0151]), a hole transporting layer composed of BTPPD (applicant's formula (XI)) disposed on the hole injecting layer (claims 17 and 18, paragraphs [0143] and [0151]), a light emitting layer disposed on the hole transporting layer, an electron transporting layer composed of Alq disposed on the light emitting layer (claims 19 and 20, paragraph [0143] and [0151]), and a cathode disposed on the electron transporting layer (paragraphs [0143] and [0151]). Ikeda further teaches that the light emitting layer is composed of an asymmetric compound that emits blue light and the asymmetric compound can be a host material (claims 2 and 3) (paragraphs [0143] and [0151], compound A1, Table 1). Ikeda teaches the asymmetric compound is a host material for a blue emitting styrylamine based light emitting molecule (claims 3, 8, 13, and 14) (paragraphs [0151] and [0152]) compound D1). Ikeda teaches A1, A2, and B10 as a preferred asymmetric compound (claims 1, 4, and 5) (paragraphs [0046], [0143], [0146] and [0151]).

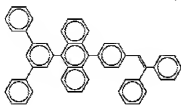


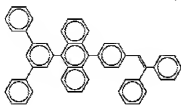
Compound A-1

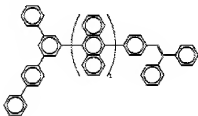
reads on applicant's formula (I) where R¹-R⁸

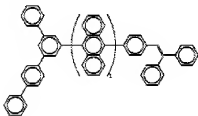
Art Unit: 1786

are hydrogen, Ar^1 is an unsubstituted aryl group having 10 nuclear carbon atoms, and Ar^2 is an unsubstituted aryl group having 20 nuclear carbon atoms (claims 1 and 4).



Compound A-2, , reads on applicant's formula (I), where R^1 - R^8 are hydrogen, Ar^1 is a substituted aryl group having 6 nuclear carbon atoms and the two substituents are both aryl groups (phenyl groups), and Ar^2 is an unsubstituted aryl group having 20 nuclear carbon atoms (claims 1 and 4). Compound B10,




, reads on applicant's formula (I), where R^1 - R^8 are hydrogen, Ar^1 is a substituted aryl group having 6 nuclear carbon atoms and the two substituents are both aryl group (phenyl and biphenyl), and Ar^2 is an substituted aryl group having 14 nuclear carbon atoms, where the aryl group that is the substituent is



(claims 1 and 4). Compound B10 reads on applicant's formula (II), where a and b are zero, c is 1, n is 1, Ar is a substituted aryl group having 14 nuclear carbon



atoms, where the aryl group that is the substituent is , Ar' is an unsubstituted aryl group having 6 nuclear carbon atoms, and X is an unsubstituted aryl

group having 12 nuclear carbon atoms (claims 1 and 5). Ikeda further teaches the blue light emitting layer has a thickness of 40 nm (paragraphs [0143] and [0151]).

11. Ikeda does not teach where the organic electroluminescent device emits white light and furthers comprises a yellow light emitting layer, wherein the yellow light emitting layer comprises the same host material as the blue light emitting layer and contains a dopant with multiple fluoranthene skeletons.

12. Fukuoka teaches a white light organic electroluminescent device, comprising in order an anode, a bluish color light emitting layer disposed on the anode, a yellow-to-reddish color light emitting layer disposed on the bluish color light emitting layer and a cathode disposed on the yellow-to-reddish color light emitting layer (paragraph [0013]). Fukuoka teaches that the yellow-to-reddish color light emitting layer contains the same host material as the bluish color light emitting layer (paragraph [0038]). Fukuoka further teaches the yellow-to-reddish color light emitting layer comprises a dopant, which is a compound having multiple fluoranthene skeletons (paragraphs [0038]-[0043], [0048]-[0050], and [0052]). Fukuoka teaches the yellow-to-reddish color dopant has a fluorescent peak wavelength 540 nm to 700 nm (paragraph [0058]). Fukuoka teaches the bluish color light emitting layer can have a thickness of 5 nm to 30 nm and the thickness of the yellow-to-reddish light emitting layer is 10 nm to 50 nm (claim 12) (paragraph [0059]). Fukuoka teaches this type of organic electroluminescent device produces a white light organic electroluminescent device with increased luminous efficiency and better white luminescence (paragraphs [0004]-[0006]).

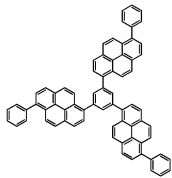
13. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify to electroluminescent device of Ikeda to include a yellow-to-reddish color light emitting layer disposed between the bluish color light emitting layer and the cathode, wherein the yellow-to-reddish color light emitting layer comprises the same host material as the bluish color light emitting layer, a dopant with a fluorescent peak wavelength of 540 nm to 700 nm, and a compound having multiple fluoranthene skeletons, and wherein the thickness of the both light emitting layer is above 5 nm. The motivation would have been to produce a white light organic electroluminescent device with increased luminous efficiency and better white luminescence.

14. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. (WO 03/087023), wherein Ikeda et al. (US 2005/0214565) (hereafter "Ikeda") is used as the English translation, in view of Fukuoka et al. (JP 2003-272857) (hereafter "Fukuoka"), wherein a machine translation is used as the English translation, as applied to claims 1-5 and 8-20 above, and further in view of Suzuki et al. (US 2002/0177009) (hereafter "Suzuki").

15. Ikeda in view of Fukuoka does not teach where the asymmetric compound is a compound that comprises a pyrene (formulae (V)-(IX)).

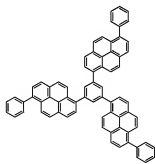
16. Suzuki teaches an organic luminescent device wherein the blue light emitting layer comprises an asymmetric pyrene compound (paragraphs [0093]-[0101], compound 27). Suzuki teaches formula (X), which can be bound to any of the formula (I)-(VII) (paragraph [0020]). Suzuki further teaches that R_{21} can be a substituted or

unsubstituted aryl group, such as phenyl, biphenyl, and terphenyl (paragraphs [0021] and [0035]) leading to asymmetric pyrene groups. In compound 27, Suzuki teaches an asymmetric pyrene wherein both the applicants' Ar³ and Ar⁴ positions in formula (V) contain either a substituted or unsubstituted aryl group. This teaching by Suzuki can



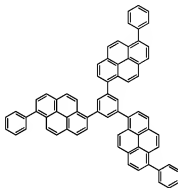
lead to a compound with the following formula,
V is used from Suzuki, and R²¹ is phenyl, Ar₁₂-Ar₁₃ are formula (X), and R₁₄-R₁₆ are hydrogen.

17. It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed an asymmetric compounds using formula (X) of Suzuki because Suzuki teaches that R₂₁ can be a substituted or unsubstituted aryl group, such as phenyl, biphenyl, and terphenyl, and the pyrene unit further comprises a substituted phenyl group, which would result in asymmetric compounds and this can lead to a



compound with the following formula,
formation and use of an asymmetric compound using formula (X) to result in a device

having very high efficiency and luminance because such a compound is within the teachings of Suzuki as a desirable material for forming an organic layer of an organic



electroluminescent device. This compound, reads on applicant's formula (V), where R^{11} - R^{18} are hydrogen, Ar^3 is an unsubstituted aryl group having 6 nuclear atoms, Ar^4 is an unsubstituted aryl group having 50 nuclear carbon atoms.

18. Suzuki also teaches compound 27, an asymmetric pyrene, reads on applicant's formula (VI), where d is 0, e and n^1 are 1, Ar^5 is an unsubstituted fused aryl group having 16 nuclear carbon atoms, and X^2 and Ar^6 are both unsubstituted aryl groups having 32 nuclear atoms.

19. Suzuki teaches the desirable fused polynuclear aromatic compounds provide organic electroluminescent devices with very high efficiency and luminance and high durability (paragraphs [0011] and [0012]).

20. Given the teachings of Suzuki it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the electroluminescent device of Ikeda in view of Fukuoka with an asymmetric pyrene compound as taught by Suzuki. Suzuki and Ikeda both teach the use of fused polynuclear aromatic compounds are compounds that can be used as light emitting layer of electroluminescence devices, but

only Suzuki teaches the use of pyrenes as one of the fused polynuclear aromatic compounds. The motivation would have been to provide organic electroluminescent devices with very high efficiency and luminance and high durability.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

22. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

24. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

25. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1786

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art
Unit 1786